UNIVERSITY OF GEORGIA EXTENSION

2020 Palmer Amaranth Control in Georgia Cotton – Back to the Basics

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Farmers have made monumental advancements in weed control and pesticide stewardship across Georgia during the past five years. Pesticide drift complaints to the Cooperative Extension Service have dropped 76% during that time and far less fields are heavily infested with Palmer amaranth at harvest. Although clear progress has been made managing pigweed, the pest remains resilient. In fact, 1,737 growers noted Palmer amaranth was the most challenging pest of Georgia agriculture during 2019 (Fig 1). Additionally in 2019, Palmer amaranth resistant to herbicides including Reflex (Fig 2), Cobra, and Ultra Blazer (PPO herbicides) was confirmed. Reviewing the basic principles of a sound management program while stewarding all pesticides are this circular's objectives.

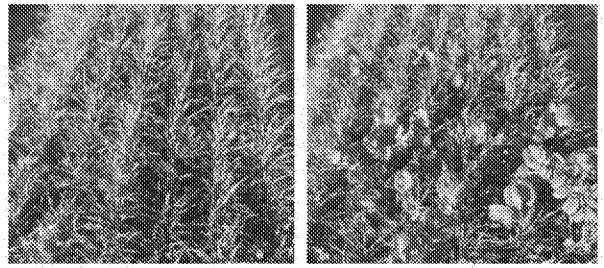
Fig 1. List Your Most Challenging Pests

Response	Times provided	Points by ranking*
Palmer amaranth, pigweed	1773	4983
Morningglory	238	572
White flies	155	318
Dayflower (spiderwort)	131	254
Sicklepod	113	223
Stink bug	105	226
White mold	61	95
Nutsedge	48	82
Nematodes	47	94
Annual grasses	41	74

*Points were determined by giving 3 points for 1st choice of importance, 2 points for 2nd choice, and 1 point for 3rd choice. All locations – 1737 growers participated

Fig 2. Reflex 96 oz/A + NIS; Palmer 2"

Fig 3. Killing emerged weeds immediately prior to planting vs immediately after planting.



Herbicide applied 4 hours before planting.

Same herbicide applied 1 hour after planting.

STEP 1: DO NOT PLANT INTO FIELDS WITH PIGWEED EMERGED

Planting into fields with emerged Palmer amaranth remains one of the greatest mistakes growers make. Valor, Direx, Gramoxone, 2,4-D and/or dicamba are among the most effective tools to prepare for planting into a Palmer-free field. Burndown should occur at least 14 days prior to planting. Make sure to also scout fields a day or two prior to planting; if Palmer is up then control them before planting. Fig 3 shows the difference of applying an effective herbicide 4 hours before planting compared to 1 hour after planting wheat; Palmer poses an even greater challenge in cotton and should not be present when planting.

STEP 2: PREEMERGENCE HERBICIDES ARE THE MOST EFFECTIVE TOOL TO PREVENT RESISTANCE TO POST HERBICIDES

Research conducted across GA during 2018/2019 showed that an effective preemergence herbicide mix reduced the number of pigweed needing to be controlled by the first POST or topical spray by 99.8%; a rolled rye cover crop was the second most effective approach reducing Palmer emergence 75%. *Growers should always mix two active ingredients effective on pigweed, applying them preemergence at rates that will not harm their cotton. Some growers have made the unwise decision to remove the at-plant herbicide which will lead to rapid Palmer resistance to topically applied herbicides (Fig 2).*

Minimizing herbicide injury from preemergence herbicides: 1. Plant **high vigor seed** especially in harsh conditions including excessively hot soils. 2. Plant into a **moist soil** (irrigate prior to planting if needed and possible). 3. Apply preemergence **two active ingredients** effective on Palmer within 24 hr of planting; use labeled rates that will not harm cotton. 4. Lightly irrigate after herbicide application but at least 40 hours prior to emergence (**avoid irrigation while cotton is emerging** if possible). 5. Irrigate to develop the perfect cotton stand, then limit irrigation events during the first 2 weeks after planting as long as cotton is not stressed. 6. **"Dusting in"** cotton is a nightmare for herbicide injury. Thus, one may want to plant cotton into fields free of weeds and then as soon as cotton emerges apply a postemergence mixture controlling emerging weeds while providing residual control. This "dusting in" program will create resistance quickly so minimize this approach as much as feasible.

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STEP 3: SEQUENTIAL TOPICALLY APPLIED HERBICIDES ARE OFTEN NEEDED IN CHALLENGING FIELDS

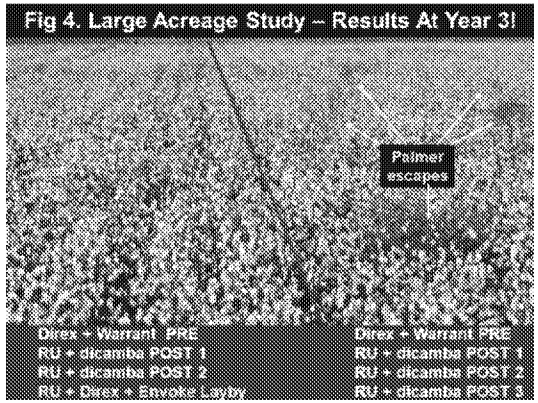
Even when at-plant herbicides perform well, pigweed has often emerged by 14 days after planting. Topical herbicide applications should occur when Palmer is less than 3"; likely occurring 14 to 18 days after planting (especially after mid-May). If the at-plant herbicide does not perform, the first topical application may need to occur around 10 days after planting. Liberty, 2,4-D or dicamba mixtures can all be effective, if timely, but these products will NOT consistently control Palmer larger than 3". *The key to understanding how to best control emerged plants larger than 3" is by understanding the interval between the first and second topical spray.* In general, the larger the pigweed when first treated, then the shorter the interval needed before the second application. Currently sequential Liberty, XtendiMax/Engenia, or Enlist One interval restrictions are 10, 7, and 12 days, respectively; do not make more than two applications of these active ingredients during a cotton crop (follow all label restrictions).

Avoid herbicide damage to cotton after the 9-leaf stage: Research suggests cotton injury near or during fruit set is more likely to be detrimental to yield as compared to early-season injury. After the 9-leaf stage one should apply directed applications using traditional herbicides which will limit cotton injury while mitigating resistance to topically applied herbicides.

STEP 4: A DIRECTED APPLICATION IS NEEDED IN MANY FIELDS

A directed or hooded application is needed for all cultivars. This application will improve weed control, reduce cotton injury, and reduce selection pressure that creates resistance to topically applied herbicides. *Fig. 4 shares the future for those relying too heavily on topically applied herbicides.* Layby applications with products like diuron, Valor, Cotoran, Envoke or other non-auxin/Liberty type products are encouraged.

Fig 4. Large Acreage Study – Results At Year 3!



STEPS TO IMPROVE ON-TARGET AUXIN HERBICIDE APPLICATIONS

1. Avoid applications near sensitive crops (Fig 5/6).

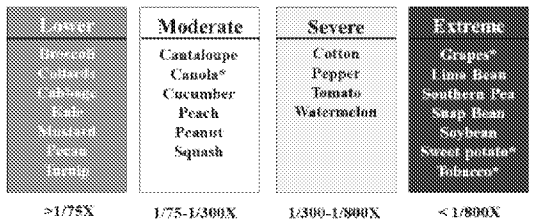
2. Apply in winds between 3-10 mph; drift can still be large.

3. Land terrain & wind direction relative to the sprayer have huge impacts on drift.

4. Max boom height above canopy or pest is 24". Drift distances can be cut in half with a 24" boom height compared to one at 50".

5. Sprayer ground speed influences drift; stay under 10 mph. No aerial applications!

Fig 5. Visual Sensitivity Scale for Dicamba

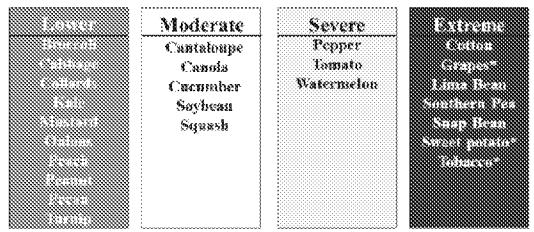


Herbicide Rate of Visually Detectable Injury

For relative comparison, tomato, squash, and watermelon response to Roundup for visual damage would be in the "lower" category.

*Data from literature; all other data generated in over 72 UGA field experiments.

Fig. 6 Visual Sensitivity Scale For 2,4-D



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Review Web Sites for Approved Spray Tips, Adjuvants, Tank Mixtures, etc.

1. Enlist Duo or Enlist One: www.EnlistTankMix.com
2. Engenia: www.engeniatankmix.com
3. XtendiMax: www.xtendimaxapplicationrequirements.com
4. Tavium: TaviumTankMix.com

6. No application made with wind toward any residential area or sensitive crop. When no downwind sensitive crop then buffers for 1X labeled dicamba rate is 110 ft and 1X labeled 2,4-D rate is 30 ft.

7. ALL APPLICATORS OF Engenia, Fexapan, XtendiMax, or Tavium must have a pesticide license.

8. DO NOT ADD AMS to any dicamba mixture.

9. Apply labeled formulations and tank mixtures only to reduce volatility/drift potential.